REMARKS/ARGUMENTS

This Amendment is responsive to the Office Action dated August 20, 2008. This Amendment is being submitted with a request for continued examination (RCE) filing, and constitutes the required submission. Applicants have amended claims 1, 4, 32, 35, 62, and 65, and added new claim 80. Applicants previously cancelled claims 16-31 and claims 47-61. Claims 1-15, 32-46, and 62-80 are now pending.

As a preliminary matter, in the Response to Amendment section on page 2, the Office Action stated that "the same claim limitations added to child application 11/472,965 are being added to the claims of this application." According to the Office Action, "even though the claims were originally restricted, the currently pending claims of these two applications are becoming the same." The Office Action noted that "applicant is requested to maintain a clear line of demarcation between these two applications otherwise a terminal disclaimer will be required between these two applications."

In response to these comments, Applicants respectively submit that there is a clear line of demarcation between the current application 10/617,455 and its child application 11/472,965, and this clear line of demarcation is specifically the line of demarcation identified by the Patent Office in the restriction requirement. In particular, the current application and its child application 11/472,965 recite claims directed to different patentable categories that were specifically restricted by the Patent Office. More specifically, the current application recites claims directed to an apparatus, an apparatus written in means-plus-function format, and a computer readable storage medium, while the child application recites claims directed to a method. The difference between a method and an apparatus was specifically the original basis of the restriction imposed by the Patent Office, and the restricted claims of the child application 11/472,965 were also similar in every respect to those of the present case, except for the demarcation between the method and the apparatus. Accordingly, a terminal disclaimer is not required. The Patent Office cannot impose a restriction of claims based on a demarcation between apparatus and method, and then later impose a double patenting rejection of the claims.

Furthermore, Applicants submit that any double patenting rejection would be in violation of MPEP 804.01 "Prohibition of Double Patenting Rejections Under 35 USC 121." The filing of the child application was a direct result of restriction requirement imposed by the Patent Office.

Therefore, any double patenting rejections, in this case, are clearly prohibited under MPEP 804.01.

Claim Rejections – 35 USC § 112

Claims 1–15, 32–46 and 62–79 stand rejected under 35 U.S.C § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Specifically, the Office Action rejected independent claims 1, 32, and 62 under 35 U.S.C. § 112, second paragraph, and rejected the dependent claims based on their dependency upon the independent claims. The Office Action also rejected dependent claims 4, 35, and 65 under 35 U.S.C. § 112, second paragraph on a separate grounds. Applicants traverse the various rejections under 35 U.S.C. § 112 to the extent such rejections may be applicable to the amended claims.

Claims 1, 32, and 62

Claims 1, 32, and 62 each require sequential evaluation of coordinates "starting at one end of the rectangular area to determine whether the one or more pixels fall with the triangular area." The Office Action asserted that this language allows each line to start at a different end of the rectangular area, and concluded that the metes and bounds of claims 1, 32, and 62 are unclear for this reason.

Applicants respectfully disagree with the analysis of the Office Action, and respectfully submit that the claims as presented in the previous response comply with 35 U.S.C. § 112. Indeed, the rejections under 35 U.S.C. § 112 are improperly directed to scope of Applicants' claims, rather than any indefiniteness. Furthermore, in the Office Action, the Patent Office appeared to have no difficulty in interpreting the claims. Accordingly, it is difficult to understand why the Patent Office thinks the claims are indefinite simply because (according to the Office Action) the claims have a scope that might be read to cover starting at different ends.

Nevertheless, solely to expedite prosecution of this Application (e.g., for reasons unrelated to patentability), Applicants have amended claims 1, 32, and 62 in an attempt to address the concerns advanced in the Office Action. Claims 1, 32, and 62, as amended, now specifically require that the evaluation of pixels starts at a common end of the rectangular area for each line of pixels, and not at a different end of the rectangular area as asserted in the Office

Action. This change is clearly supported by FIG. 2 of the current application, which is discussed in greater detail below. On the basis of the comments above and the claim amendments to claims 1, 32 and 62, Applicants respectfully request withdrawal of the rejections of claims 1, 32, and 62 under 35 U.S.C. § 112, second paragraph.

Claims 4, 35, and 65

The Office Action also asserted that claims 4, 35, and 65 do not claim the use of the result of the claimed equation, and that the relationships between claims 4, 35, and 65 and their parent claims 3, 34, and 64 are unclear. Based on these assertions, the Office Action concluded that the metes and bounds of claims 4, 35, and 65 are unclear.

Applicants have amended claims 4, 35, and 65 to clarify the connection with their parent claims 3, 34, and 64, and to address the concerns advanced in the Office Action. In view of these clarifications, Applicants respectfully request withdrawal of the rejections of claims 4, 35, and 65 under 35 U.S.C. § 112, second paragraph.

Dependent Claims

Since the other dependent claims appear to stand rejected under 35 U.S.C. § 112, second paragraph based solely on their dependency upon independent claims 1, 32, and 62, Applicants respectfully request withdrawal of the 35 U.S.C. § 112, second paragraph rejection for the dependent claims.

Claim Rejections – 35 USC § 103

Claims 1, 2, 5, 6, 9, 10, 11, 12, 15, 32, 33, 36, 37, 40, 41, 42, 43, 46, 62, 63, 66, 67, 70, 71, 72, 73 and 76–79 stand rejected under 35 USC § 103 as being obvious over Watkins (US 5,598,517) in view of Pineda ("A Parallel Algorithm for Polygon Rasterization"), which was incorporated by reference in Watkins. Claims 3, 7, 34, 38, 64 and 68 also stand rejected under 35 USC § 103 as being obvious over Watkins in view Pineda. Claims 13, 14, 44, 45, 74 and 75 stand rejected under 35 USC § 103 as being obvious over Watkins in view of Pineda and Applicants' admitted prior art (AAPA).

Applicants respectfully traverse the rejections to the extent the rejection may be applicable to the amended claims. The applied references fail to disclose or suggest the features

of Applicants' claims. Furthermore, other than the advantages and disclosure set forth in Applicants' own specification, the Office Action failed to articulate any rational reason that would have led a person of ordinary skill in the art to arrive at the features of Applicants' claims.

Claim 1

Independent claim 1 recites an apparatus comprising a rendering engine that defines a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered, wherein the rectangular area of pixels includes one or more lines of pixels. According to claim 1, the rendering engine selects each of the one or more lines of pixels within the rectangular area of pixels, sequentially evaluates coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area to determine whether the one or more pixels fall within the triangular area, wherein the one end of the rectangular area is common for the sequential evaluation of each line of pixels, ceases evaluation of the coordinates associated with the pixels of each line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area, and stores information indicating which of the pixels fall within the triangular area.

For purpose of illustration, Applicants have once again reproduced FIG. 2 of the present application below.

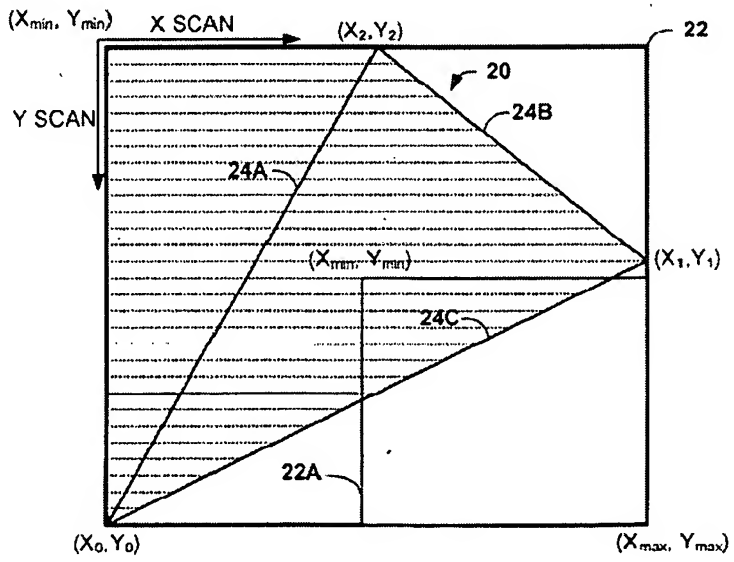


FIG. 2

As illustrated in FIG. 2, rectangular area 22 bounds an entire triangle to be rendered. In this example, the entire triangle to be rendered is defined by edges 24A, 24B and 24C, or alternatively by vertices (X_0, Y_0), (X_1, Y_1) and (X_2, Y_2).

As illustrated by the dotted lines in FIG. 2, coordinates are evaluated starting at one end of the rectangular area (i.e., a common end) to determine whether the pixels fall within the triangular area. For each line, upon determining that at least one pixel of a line falls within the triangular area and a current pixel no longer falls within the triangular area, the evaluation of the coordinates ceases for that line, and the evaluation of the next line is performed in the exact same manner. As illustrated by the dotted lines in FIG. 2, coordinates are then evaluated for the next line starting at the same end of the rectangular area as the evaluation of the previous line in order to determine whether the pixels of the next line fall within the triangular area. The process repeats for each line, starting each line at the same end of the rectangular area, until the evaluation of the last line of the rectangular area is completed.

The ceasing of these evaluations in each respective line is illustrated by the absence of dotted lines in the X-direction beyond the right-most sides of the triangle to be rendered. In this case, the computations associated with theses ceased evaluations can be avoided to promote processing efficiency. FIG. 2 is provided merely for illustration purposes only.

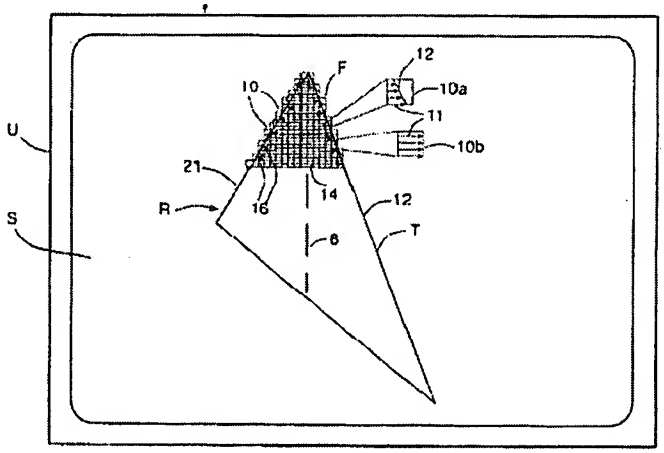
The features of claim 1 can reduce the number of computations required for triangular rendering in the context of a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered. Specifically, claim 1 requires that the rendering engine ceases evaluation of the coordinates associated with the pixels of the line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area. By ceasing such evaluations, efficient processing is promoted.

In this Amendment, Applicants have specifically amended claim 1 to require that the rendering engine starts at a common end of the rectangular area for every line of pixels in the rectangular area. Similar amendments were made to the other independent claims. These claim amendments should clarify the claims for purposes of the rejections under 35 U.S.C. 112, but do not materially change the scope of the claims relative to the interpretations advanced in the Office Action.

Watkins in view of Pineda fails to teach or suggest the features of claim 1. In particular, neither Watkins, nor Pineda, nor any combination of these two references discloses any technique in which a rendering engine sequentially evaluates coordinates associated with the pixels of each line of pixels starting at a common end of the rectangular area for every line of pixels in the rectangular area, and ceases evaluation of the coordinates associated with the pixels of each line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area.

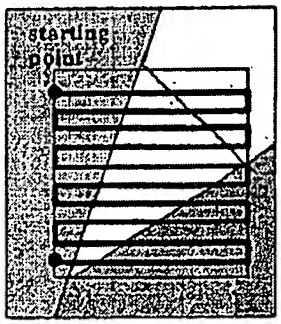
Furthermore, neither Watkins nor Pineda suggest any rational reason that would have led a person of ordinary skill in the art to arrive at the features of claim 1.

The illustration below is a portion of FIG. 1 of Watkins, which was also explained in the previous response.



Watkins clearly shows a triangle being rendered on a display screen. However, Watkins does not define any rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered. Instead, Watkins scans only those pixels that are bounded by the triangle itself. In addition, Watkins scans back and forth within the triangle, but does not evaluate coordinates associated with the pixels of the line of pixels starting at one common end of a rectangular area to determine whether the pixels fall within the triangular area. For each of these reasons, claim 1 clearly distinguishes the teaching of Watkins.

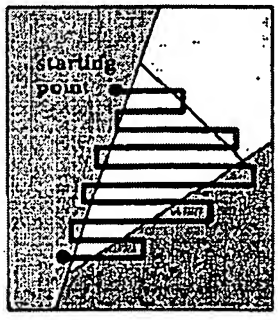
The teaching of Pineda is similar to Watkins in some embodiments, but also provides additional embodiments, such as that shown in the figure reproduced below, which corresponds to a portion of FIG. 3 in Pineda.



Traversing the Bounding Box

This FIG. from Pineda shows a conventional way of traversing a bounding rectangular area, e.g., "bounding box." In this case, however, Pineda fails to disclose or suggest that the rendering engine ceases evaluation of the coordinates associated with the pixels of the line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area, as required by claim 1. In addition, like Watkins, Pineda fails to disclose or suggest any technique in which the rendering engine begins processing each sequential line on a common side of the bounding box. Instead, like Watkins, the technique of Pineda scans back and forth in serpentine fashion, starting each sequential lines on a different side of the bounding box, e.g., in a back-and-forth manner. In addition, the FIG. above clearly shows that Pineda evaluates all of the coordinates of the bounding box, and never "ceases evaluations upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area," as required by claim 1..

Pineda then shows a "more efficient traversal algorithm," in the section portion of FIG. 3 reproduced below.



A More Efficient Traversal Algorithm

This example, however, is very similar to the teaching of Watkins discussed above. In particular, this example from Pineda does not define any rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered. Instead, this example from Pineda scans only those pixels that are bounded by the triangle itself. Furthermore, this example from Pineda also fails to start each line on a common side, but instead, scans back and forth within the triangle. Accordingly, Pineda does not evaluate coordinates associated with the pixels of the line of pixels starting at a common end of a rectangular area to determine whether the pixels fall within the triangular area. For this reason, claim 1 clearly distinguishes this teaching of Pineda.

The features of the current claims provide a different approach than those of Watkins or Pineda, or any combination of these references. Moreover, the features of claim 1 can provide advantages of simplicity associated with a rendering engine that defines a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered. At the same time, the features of claim 1 may reduce the number of computations required for triangular rendering in the context of a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered. Specifically, claim 1 recites that the rendering engine ceases evaluation of the coordinates associated with the pixels of the line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area.

In some cases, the techniques of claim 1 may not be as "efficient" as the "more efficient traversal algorithm" of Pineda shown above or the triangle rendering of Watkins discussed above in terms of the number of pixels scanned. However, the features of claim 1 have simplicity advantages relative to the "more efficient traversal algorithm" of Pineda shown above and the triangle rendering of Watkins insofar as the features of claim 1 use a bounding rectangle approach.

In addition, the techniques of claim 1 provide for a reduction in the number of computations relative to the "traversing the bounding box" approach of Pineda shown above. Basically, the techniques of claim 1 provide for the simplicity associated with the "traversing the bounding box" approach of Pineda, while reducing the number of computations associated with this type of simple approach.

The Office Action specifically admitted that Watkins fails to teach that a rendering engine that "sequentially evaluates coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area," as required by claim 1.[1] However, the Office Action appears to have cited Pineda as teaching the sequential evaluation of coordinates associated with the pixels. Unfortunately, however, Pineda fails to teach or suggest any sequential evaluation of coordinates starts at a common end of the rectangular area for every line of pixels, as required by Applicants' claims. Indeed, the Office Action even recognized that "Pineda allows each line to start at a different end of the rectangular area.[2]"

Accordingly, neither Watkins nor Pineda, nor any combination of these references suggests a triangle rendering technique that starts at a common end of the rectangular area for every line of pixels in a rectangular area, and ceases evaluation of the coordinates associated with the pixels of the line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area.

Even though the Office Action acknowledged that Watkins and Pineda do not teach sequential evaluation of coordinates starting at one end of the rectangular area, as required by claim 1, in support of the rejection, the Office Action asserted that it would have been obvious to a person of ordinary skill in the art to start at one end of the rectangular area. Specifically, the Office Action reasoned that it would be obvious to one of ordinary skill in the art to start at one end of the rectangular area because searching for one edge of the triangle is simpler than searching for both edges of the triangle, which may save processing time while by not scanning pixels beyond the triangle edge.[3]

This argument is flawed insofar as Applicants' claims are not directed to any technique that searches lines beginning at one edge of the triangle or both edges of the triangle. Instead, Applicants' claims require sequentially evaluation of coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area, not the triangle. The Office Action provided no evidence to establish that it would be easier to start at one end of a bounding box rather than meandering back-and-forth at opposing ends of the bounding box. Furthermore, the Office Action provided no rational reason that a person of ordinary skill in the art would have

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[1] Final Office Action, dated August 8, 2008, page 6 and 9.
[2] Final Office Action, dated August 8, 2008, page 4.

sought modification of this meandering back-and-forth aspect of Pineda in order to start at one end of a bounding box. The position of the Office Action that it would be easier to start at one end of a bounding box rather than meandering back-and-forth at opposing ends of the bounding box is nothing more than conjecture by the Patent Office, unsupported by any evidence from the prior art or general knowledge.

Applicants' disclosure, in contrast, provides a specific teaching of advantages that can be achieved by starting at one end of a bounding box. In this case, sequentially evaluation of coordinates for any given line can be terminated for each line upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area, e.g. as illustrated in FIG. 2, reproduced above. Indeed, the pending claims specifically recite such features i.e., ceasing evaluation of the coordinates associated with the pixels of each line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area.

Of course, the teaching of Applicants' own disclosure cannot be used by the Patent Office as a reason that a person of ordinary skill in the art would have modified Watkins in view of Pineda to arrive at a technique in which rendering engine would be made to start at one end of a bounding box and cease evaluation of the coordinates associated with the pixels of each line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area. On the contrary, it is improper for the Patent Office to use Applicants' own disclosure as a blueprint for reconstruction of the claimed invention from the prior art. Nothing in the prior art or general knowledge in the field of triangle rendering supports the conclusion in the Office Action that Watkins in view of Pineda would have suggested the features of Applicants' claims.

In summary, Watkins and Pineda show scanning back and forth, which is contrary to the features of claim 1. Any processing benefits and simplicity benefits associated with Applicants' claimed approach would have been appreciated by one of ordinary skill in the art only upon access to Applicants' specification. Accordingly, the processing benefits and simplicity benefits recited by the Office Action are not sufficient to support the conclusion of obviousness, and are

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[1] Final Office Action, dated August 8, 2008, page 6 and 9.

clearly the use of impermissible hindsight by the Patent Office. Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection for claim 1.

Claims 32 and 62

Independent claim 32 recites an apparatus comprising means for rendering that defines a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered, wherein the rectangular area of pixels includes one or more lines of pixels, the means for rendering further selects each of the one or more lines of pixels within the rectangular area of pixels, sequentially evaluates coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area to determine whether the one or more pixels fall within the triangular area, wherein the one end of the rectangular area is common for the sequential evaluation of each line of pixels, and ceases evaluation of the coordinates associated with the pixels of each line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area, and means for storing information indicating which of the pixels fall within the triangular area.

Claim 32 is similar to claim 1 for purposes of the analysis above. In particular, the different embodiments of Watkins and Pineda fail to suggest any apparatus that comprises a means for rendering that defines a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered, sequentially evaluates coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area to determine whether the one or more pixels fall within the triangular area, wherein the one end of the rectangular area is common for the sequential evaluation of each line of pixels, and ceases evaluation of the coordinates associated with the pixels of each line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area. Claim 32 generally includes similar limitations to those of claim 1. Instead of requiring a rendering engine of claim 1, claim 32 requires a means for rendering.

Claim 62 recites a computer-readable storage medium comprising one or more memory devices that store instructions that cause one or more processors to: define a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered, wherein the rectangular area of pixels includes one or more lines of pixels, select each of the one or more lines of pixels within the rectangular area of pixels, sequentially evaluate coordinates

associated with the pixels of each line of pixels starting at one end of the rectangular area to determine whether the one or more pixels fall within the triangular area, wherein the one end of the rectangular area is common for the sequential evaluation of each line of pixels, cease evaluation of the coordinates associated with the pixels of each line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area, and store information indicating which of the pixels fall within the triangular area.

Claim 62 is also similar to claim 1 for purposes of the analysis above. Claim 62 generally includes all of the limitations of claim 1, but instead of requiring a rendering engine to perform various tasks for triangle rendering, claim 62 requires instructions that cause one or more processors to perform the tasks.

Again, the different techniques of Watkins and Pineda either scan all of the pixels in a bounding box approach without ceasing evaluation or scan only those pixels that are bounded by the triangle itself, without defining any bounding rectangular area. Furthermore, both Watkins and Pineda scan pixels in a back-and-forth, meandering manner, without starting each line at a common end of the rectangular area. Applicants' disclosure provides specific reasons for starting each line at a common end of the rectangular area, i.e., to allow the evaluations of each line to be ceased upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area. Nothing in the prior art or in general knowledge would have led a person of ordinary skill to such features without the benefit of Applicants' disclosure.

In view of the arguments above with respect to claim 1, claim 32 and 62 should be allowed.

Dependent Claims

In view of the comments above, dependent claims 2-15, and 77 should be allowed by virtue of their dependency upon claim 1. Dependent claims 33-46, and 78 should be allowed by virtue of their dependency upon claim 32. Dependent claims 63-76, and 79 should be allowed by virtue of their dependency upon claim 62. Applicants reserve substantive comment for dependent claims 2-15, 33-46, and 63-79. In reserving comment, however, Applicants do not acquiesce to the rejections or interpretations of the prior art advanced in the Office Action.

Allowable Subject Matter

On page 21 of the Office Action, the Patent Office indicated that claims 8, 39 and 69 would be allowable if rewritten or amended to overcome the rejection under 35 U.S.C § 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Applicants appreciate the indication of allowability. As described above with respect to the 35 U.S.C. § 112, second paragraph rejection, Applicants have amended the independent claims to overcome the 35 U.S.C. § 112, second paragraph rejection. Accordingly, the 35 U.S.C. § 112, second paragraph rejection for claims 8, 39, and 69 are rendered moot. However, Applicants have not amended the independent claims to include the features of claims 8, 39, and 69 at this time because Applicants maintain that the independent claims are allowable for the reasons advanced above.

CONCLUSION

In light of the claim amendment and foregoing comments, Applicants submit that the application is in condition for allowance, for which early action is requested.

Please charge any fees or overpayments that may be due with this response to Deposit Account No. 17-0026.

Respectfully submitted,

Dated: Dec 17, 2008

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